Transportation Synthesis Report

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Constructability Reviews

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Transportation Synthesis Reports (TSRs) are brief summaries of currently available information on topics of interest to WisDOT technical staff in highway development, construction and operations. Online and print sources include NCHRP and other TRB programs, AASHTO, the research and practices of other state DOTs, and related academic and industry research.

REQUEST FOR REPORT

The constructability (sometimes spelled "-ibility") review process (CRP), in which contractors, industry experts, project engineers, or the public comment on project plans before groundbreaking, is designed to save time and money. The RD&T Program was asked to find out the extent to which constructability reviews are used by other state DOTs and how the process is carried out. RD&T searched national and state information sources to find the preliminary information in this report.

SUMMARY

At least a dozen states conduct constructability reviews. This number is growing. In many of these states, the processes are formalized in policy, and in every case the results have pleased the participants. In California, for instance, constructability reviews address environmental concerns, traffic problems, and noise pollution issues before any of these materialize; as the practice spreads, more participants stress such benefits, in addition to the expected cost and time reductions. A few agencies keep the process an internal one, but most look outside their walls, employing contractor associations for rosters of reviewers, soliciting comments from all contractors eligible to bid, or seeking public input. California is conducting a pilot of "enhanced" constructability review with contractors making comments on a Caltrans Web site. The responsibility for the reviews, however, ultimately falls on project designers and planners.

STATE PRACTICES

Only four of the following eleven transportation agencies keep the constructability review process entirely internal, and of those, Maryland does so by employing someone retired from the construction industry, and California is experimenting with externalizing the process via the Internet. Most of these eleven seek comment from outsiders drawn from contractor associations, pre-qualification lists, or even from public hearings or Web site comments. Traditionally engaged on large projects only, constructability reviews are moving into all transportation construction or rehabilitation projects.

Externally Involved Process

Arizona. http://www.ops.fhwa.dot.gov/wz/wzguidbk/Documents/hp-mc2.htm and http://www.ops.fhwa.dot.gov/wz/wzguidbk/Documents/hp-az3.htm. In Arizona, CRP attempts to involve the public.

1. On all major new or reconstruction projects, it invites comment on designs, using community input to reshape plans in what seems a public relations effort designed to give a community a sense of ownership on individual construction projects.

2. For large, generally urban freeway projects, a second process, called Traffic Management Workgroups, gathers representatives from various civic groups and municipal agencies, as well as engineers, to review upcoming projects with a view toward community-sensitive design and scheduling.

For either form, contact Phil Bleyl, Area Engineer for FHWA's Arizona Division, 602-379-3913 or Phil.Bleyl@fhwa.dot.gov.

Colorado. http://ops.fhwa.dot.gov/wz/wzguidbk/Documents/hp-co1.htm. On complex or high visibility projects, when project plans are 30 percent complete, a contractor from the Colorado Contractor's Association reviews and critiques plans. Done for cost savings and reduced congestion during construction. Contact Frank Muldowney, Safety Services, 303-273-1840, or Ed Fink, Maintenance Supt., 303-273-1840; both of CDOT Maintenance and Operations Branch.

Indiana. http://ops.fhwa.dot.gov/wz/wzguidbk/Documents/hp-in8.htm. Team approaches to various disciplines have proved rewarding to the DOT on high visibility (urban freeway) projects. Part of the DOT's Transportation Management Plans and includes all planning stages from scheduling and timing with other projects to traffic control and design. James Poturalski, Chief of Contracts and Constructions, 317-232-5502 or poturalski@indot.state.in.us.

North Carolina. http://ops.fhwa.dot.gov/wz/wzguidbk/Documents/hp-nc12.htm. Used in major rehabilitation and new construction of high-volume, urban freeways with environmental mitigation concerns, and draws on members of North Carolina Contractor's Association for review. Resulted in occasionally dramatic decreases in contract time, as well as reductions in contract costs, user costs and improvements in traffic control designs. Steve DeWitt, P.E., State Construction Engineer, NCDOT, 919-733-2210.

Oklahoma. http://ops.fhwa.dot.gov/wz/wzguidbk/Documents/hp-ok2.htm. By submitting projects of over $5 million for review to all eligible contractors before advertising project, Oklahoma has produced economical and efficient projects, with errors eliminated before bidding. Process also results in more accurate bids from contractors that have become very familiar with the projects. Jack Stewart, Specifications Engineer, 405-521-2625.

Oregon. http://www.odot.state.or.us/techserv/progsrv/contract/constructability.htm. ODOT draws from a list of registered contractors for its CRP, as well as for a post-construction review. The process is designed to cut construction costs, reduce work schedule length, reduce change and extra work orders, and improve public and construction safety.

1. Project leaders manage the CRP on location, but responsibility ultimately falls on the Project Delivery Business Line leader. The review entails two stages.
2. The first stage, an Internal Review, entails having the Project Team for the particular project review project plans internally in a meeting conducted by the Project Leader. Focus should be on staging and environmental matters.
3. For the second stage, an External Review, the project leader enlists at least two registered reviewers from Associated General Contractors of Oregon. Following receipt of plans and appropriate material, a review meeting is conducted when plans are 30 to 50 percent complete.

Mike Wolfe, Project Delivery Business Line Leader, 503-986-4412.

Virginia. http://ops.fhwa.dot.gov/wz/wzguidbk/Documents/hp-va1.htm. On major projects, independent consultants and sometimes contractors review project plans to help sequence work, optimize construction time and lessen impact on traffic. J.T. Mills, State Location and Design Engineer, VDOT, 804-786-2507 or Mills_jt@vdot.state.va.us.

Internal Process

California. http://ops.fhwa.dot.gov/wz/wzguidbk/Documents/hp-ca8.htm. Implemented for all projects over $750,000, looking at traffic, design, construction, maintenance and more.

1. Focuses on reducing project construction time, maintenance needs, public inconvenience. Jim Deluca, Senior Transportation Engineer, 916-653-4067 or jdeluca@trmx3.dot.ca.gov.

2. On the ongoing Sacramento River Bridge project, Caltrans honed design choices to address environmental concerns over migratory fish, highway and river traffic, and noise pollution. See "Caltrans Rebuilds Sacramento River Bridge." K. Stidger, *Better Roads*, v. 72 (8), August 2002, pp. 36-41; http://www.betterroads.com/articles/aug02c.htm.
3. A new process, called Enhanced Constructability Review, allows highway construction industry members to review and comment online upon the constructability of preliminary designs. See http://www.dot.ca.gov/hq/esc/oe/ecr/.

Florida. http://ops.fhwa.dot.gov/wz/wzguidbk/Documents/hp-fl11.htm. Employs FDOT personnel early in design stages for CR on all projects, with aim of creating smooth construction product by increasing quality, reducing inconvenience to public, curtailing supplemental contracts and claims. John Shriner, State Scheduling Engineer, Florida DOT, 850-414-4149 or john.shriner@dot.state.fl.us.

- For policy, see Project Administration Manual (re-codified July, 2002), §1.1, Plans Review and Comments in Pre-Letting Activities at http://www11.myflorida.com/construction/manuals/cpam/CPAM70000000/Current%20PDF_Files/ch1s1_1.pdf.

Maryland. http://ops.fhwa.dot.gov/wz/wzguidbk/Documents/hp-md8.htm and http://www.sha.state.md.us/aboutus/orgchart/obd/obd.asp. The State Highway Administration's Bridge Quality Assurance Unit conducts constructability reviews. The state keeps a retired bridge engineer on staff part-time, a person who lends over 35 years of bridge-building experience to the design process. Contact Bob Harrison, deputy chief engineer of construction, 410-545-0072 or rharrison@sha.state.md.us.

Texas. http://www.ops.fhwa.dot.gov/wz/wzguidbk/Documents/hp-tx1.htm. On major projects, Texas addresses constructability in its Value Engineering process, with a focus on traffic management. Robert R. Kovar, Deputy Director of the Design Division, 512-416-2242 and RKOVAR@dot.state.tx.us.

NATIONAL INFORMATION SOURCES

***Constructability Review Best Practices Guide,* AASHTO Subcommittee on Construction, Aug. 2000.** Link at http://www.transportation.org/community/reports.nsf/By+Category+Public?openview. Reviews practices of various states. Heading the task force behind this guide is Art Gruhn of Connecticut DOT: arthur.gruhn@po.state.ct.us, or 860-594-2680.

***Cost/Benefits of Constructibility Reviews,* NCHRP, April 12, 2002.** Access from following site: http://transportation.org/download/default.htm. An excellent overview of the process and its cost benefits. Commissioned by the NCHRP, it includes recommendations for newcomers to the process. (Large 11 MB file requires a minute or so to download.)

***Constructibility Review Process for Transportation Facilities,* NCHRP Project 10-42, Texas A&M Research Foundation, Stuart D. Anderson and Deborah J. Fisher, completed Dec. 31, 1996.** Available in the WisDOT Library, 8th Floor HFSTB.

1. NCHRP Report 390, *Constructibility Review Process for Transportation Facilities,* published in 1997.
2. NCHRP Report 391, *Constructibility Review Process for Transportation Facilities – Workbook,* published in 1997.

FHWA Office of Operations. The following sites contain information summarized above in state practice descriptions: http://ops.fhwa.dot.gov/wz/wzguidbk/links/topic13.htm and http://www.ops.fhwa.dot.gov/wz/wzguidbk/links/category9.htm.

JOURNALS

In the last several years, as constructability reviews become more widely practiced, journal articles on the process have shifted focus from benefits in project costs and brevity to environmental and other benefits, like reductions in noise pollution, increased traffic efficiency, and improved future maintainability.

"Constructability Analysis in the Design Firm," Arditi, D., A. Elhassan and YC Toklu. ***Journal of Construction Engineering and Management*****, v. 128(2), March 2002, pp. 117-126.** Order, or if subscriber view, by following links from http://ojps.aip.org/dbt/dbt.jsp?KEY=JCEMD4&Volume=128. As a design interest, constructability has been engaged earlier and earlier in project planning stages. This piece looks at designer practices and recommends steps for performing reviews.

"Expanded Constructability Reviews," G. Berthelsen. ***California Department of Transportation Journal*****, v. 2 (4), Jan. 2002, pp. 42-45.**
http://www.dot.ca.gov/dist07/aboutdist7/pubs/journals/Jan_Feb_2002/html/Journal_Jan_Feb_2002.html. California DOT uses the process to reduce change-order delays and costs after construction has started. Caltrans seeks input from a wide array of relevant engineers on traffic handling, weather conditions, local geographic features; teams a resident engineer with design engineer to analyze plans; solicits comments from contractors before bidding.

"Integrating Constructability into Project Development: A Process Approach," S.D. Anderson, D.J. Fisher and S.P. Rahman. ***Journal of Construction Engineering and Management*****, v. 126 (2), March 2000, pp. 81-88.** Order, or if subscriber view, by following links from http://ojps.aip.org/dbt/dbt.jsp?KEY=JCEMD4&Volume=126. Describes development of NCHRP project to create a constructability review process in three stages: planning, design and construction. Developed seven functions for each phase, and tested in two transportation projects.